Nos. 22-2069, -2070, -2071, -2072

IN THE

United States Court of Appeals

FOR THE FEDERAL CIRCUIT

MASIMO CORPORATION,

Appellant,

v.

APPLE INC.,

Appellee.

APPEAL FROM THE PATENT TRIAL AND APPEAL BOARD
CASE NOS. IPR2021-00193, IPR2021-00195, IPR2021-00208, IPR2021-00209

BRIEF OF APPELLANT MASIMO CORPORATION

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December 29, 2022

Illustrative Claim of U.S. Patent No. 10,258,266

1. A noninvasive optical physiological sensor comprising:

a plurality of emitters configured to emit light into tissue of a user;

a plurality of detectors configured to detect light that has been attenuated by tissue of the user, wherein the plurality of detectors comprise at least four detectors;

a housing configured to house at least the plurality of detectors; and

a lens configured to be located between the tissue of the user and the plurality of detectors when the noninvasive optical physiological sensor is worn by the user, wherein the lens comprises a single outwardly protruding convex surface configured to cause tissue of the user to conform to at least a portion of the single outwardly protruding convex surface when the noninvasive optical physiological sensor worn by the user and during operation of the noninvasive optical physiological sensor.

CERTIFICATE OF INTEREST

Counsel for Appellant Masimo Corporation certifies the following:

1. The full name of every party represented by me is:

Masimo Corporation.

2. The name of the real party-in-interest represented by me is:

Masimo Corporation.

3. All parent corporations and any publicly held companies that own more than 10 percent or more of the stock of the party represented by me are:

BlackRock Inc.

4. The name of all law firms and the partners or associates that appeared for the party in the lower tribunal or are expected to appear for the party in this court and who are not listed on the docket for the current case:

Knobbe, Martens, Olson & Bear, LLP: Jacob L. Peterson.

5. The case titles and numbers of any case known to be pending in this court or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal:

- *Masimo Corporation v. Apple Inc.*, U.S. Court of Appeals for the Federal Circuit, Case No. 22-1631 (consolidated with Case Nos. 22-1632, 22-1633, 22-1634, 22-1635, 22-1636, 22-1637, 22-1638)

- *Masimo Corporation v. Apple Inc.*, U.S. Court of Appeals for the Federal Circuit, Case No. 22-1972 (consolidated with Case Nos. 22-1973, -1975, -1976)
- *Masimo Corporation and Cercacor Laboratories, Inc. v. Apple Inc.*, U.S. District Court for the Central District of California, Case No. 8:20-cv-00048-JVS

6. Information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees):

Not applicable.

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TABLE OF ABBREVIATIONS

Abbreviation	Meaning
’708 patent	U.S. Patent No. 10,299,708
’190 patent	U.S. Patent No. 10,376,190
’266 patent	U.S. Patent No. 10,258,266
’191 patent	U.S. Patent No. 10,376,191
IPR193	IPR2021-00193
IPR195	IPR2021-00195
IPR208	IPR2021-00208
IPR209	IPR2021-00209
Aizawa	U.S. Pat. App. Publ. No. 2002/0188210
Inokawa	Japanese Pat. App. Publ. No. 20060296564 (English translation)
Ohsaki	U.S. Pat. App. Publ. No. 2001/0056243
Mendelson-1988	Mendelson et al., Design and Evaluation of a New Reflectance Pulse Oximeter Sensor
Mendelson-799	U.S. Pat. No. 6,801,799
Nishikawa	U.S. Pat. App. Publ. No. 2007/0145255
Nanba	U.S. Pat. No. 8,177,720
POSITA	Person of Ordinary Skill in the Art

STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, Counsel is aware of the following pending cases that will be directly affected by this Court's decision in the pending appeal:

- *Masimo Corporation v. Apple Inc.*, U.S. Court of Appeals for the Federal Circuit, Case No. 22-1631 (consolidated with Case Nos. 22-1632, 22-1633, 22-1634, 22-1635, 22-1636, 22-1637, 22-1638)
- *Masimo Corporation v. Apple Inc.*, U.S. Court of Appeals for the Federal Circuit, Case No. 22-1972 (consolidated with Case Nos. 22-1973, 22-1975, 22-1976)
- *Masimo Corporation and Cercacor Laboratories, Inc., v. Apple Inc.*, 8:20-cv-00048-JVS (C.D. Cal.)

I. INTRODUCTION

This appeal addresses four patents, four IPRs, and repeated mistakes by the Board. The Board's errors led it to invalidate numerous claims directed to Masimo's innovative optical sensors for noninvasively measuring the constituents of a person's blood.

Inventor Joe Kiani founded Masimo as a garage start-up in 1989 to improve devices for measuring oxygen saturation of blood. Masimo revolutionized technology for noninvasively measuring oxygen saturation, becoming the leading supplier worldwide. Over the years, Masimo also developed revolutionary technology for noninvasively measuring difficult and previously unattainable blood constituents. Today, Masimo's products are used yearly on over two-hundred million patients to noninvasively measure many blood constituents.

The Masimo patents at issue here arose from a search for improvements to the signal strength of noninvasive optical sensors to enable measurement of previously unmeasurable blood constituents, such as carbon monoxide, methemoglobin, total hemoglobin, and blood glucose. Noninvasive physiological optical sensors emit light into skin tissue and detect that light after passing through the tissue. Through extensive research and innovation, the inventors discovered that certain structural features surprisingly worked together to increase signal strength by an order of magnitude. During prosecution, the examiners, who collectively have decades of

experience examining applications in the field, agreed the claimed combinations were a patentable advance unique in the field.

No prior art discloses Masimo's innovative approach, including a physiological sensor with a convex cover positioned over multiple detectors (much less combined with the other claimed features). The inventors' discoveries contradicted conventional wisdom, as taught in the very prior art relied upon by Apple. The petitions attempted to recreate Masimo's claims by combining disparate features from different references that actually discourage the combinations. But even small structural changes to a physiological optical sensor may have significant consequences on the weak signal that is monitored.

The Board nonetheless accepted the petitions' proposed dramatic changes to prior art sensors, with no motivation to do so coming from the references. The Board disregarded the express teachings within the four corners of those references in favor of hindsight-driven opinions from Apple's expert. For example, the Board found a POSITA would have been motivated to convert a sensor's surface, which the prior art disclosed and taught should be flat, to a convex surface to supposedly increase "light collection." But the references relied on by the Board taught that a flat surface improves light detection. Moreover, those references, and thus the Board's resulting combinations, placed detectors at the sensor's ***periphery***. Apple and its expert repeatedly admitted that a convex surface condenses light toward the sensor's ***center***

and thus ***away*** from the periphery. Accordingly, far from increasing light collection, a POSITA would have expected the combinations' convex surface to ***decrease*** light collection—the exact opposite of the Board's motivation to combine.

After Apple filed its petitions, and Masimo exposed this fundamental flaw in Apple's combinations, Apple changed course and contradicted its initial position, expert declarations, and expert deposition testimony. Apple asserted an assortment of new and unsupported theories that allegedly showed the combinations would supposedly increase light at peripheral detectors.

The Board erred by not reconciling Apple's initial positions and numerous admissions in its analysis. Instead, the Board adopted one of Apple's new theories on reply—that light would be increased by placing the "most pronounced" curvature of the convex surface "near" the detectors. But the Board made no attempt to reconcile that theory with Apple's original theory and numerous admissions.

The Board's adopted "most pronounced curvature" theory is also unsupported by the art. ***No*** prior art supports that a POSITA would have employed the "most pronounced curvature" theory, much less that a POSITA would have arrived at a physiological sensor with a ***single*** convex cover over multiple detectors, among other claimed features. To the contrary, the prior art discouraged such a configuration.

The Board also accepted another theory for some combinations—that a POSITA would have been motivated to add a convex surface to prevent slippage on a user's skin. The Board concluded that a POSITA would have been motivated to add a convex surface to a prior-art sensor worn on the wrist's palm-side. But the references relied on by the Board taught the exact opposite. Specifically, (1) one reference taught a convex surface slips on the palm-side; and (2) the other taught a flat surface improves adhesion on the palm-side. The Board's finding contradicted the express disclosures of ***both*** references. The Board erred by failing to reconcile the express disclosures that undermine its finding.

The Board additionally erred in finding a POSITA would have believed there would have been a reasonable expectation of success. This Court's precedent requires a clear evidence-based explanation of a proposed combination and how it would function. The Board provided no such explanation, nor could it. Apple's expert repeatedly retreated from his own illustrations of the combinations, and instead emphasized the complexity of physiological sensors. Apple's expert pointed to numerous factors that would impact a convex cover's design and essentially argued that a POSITA would "figure it out" and arrive at some undisclosed structure. Such testimony falls far short of showing a POSITA would have reasonably expected success, especially given Apple's dramatic and unsupported changes to the prior-art sensors.

Over the years, Masimo has developed a range of technologies that revolutionized the field of noninvasive monitoring. *See Mallinckrodt, Inc. v. Masimo Corp.*, 147 F. App'x 158, 163 (Fed. Cir. 2005) (nonprecedential); *Masimo Corp. v. Philips Elec. N. Amer. Corp*., 2015 WL 2379485, at *1 (D. Del. May 18, 2015). Masimo's various patents over the years have withstood extensive litigation and are recognized by the industry and courts as fundamental innovations. *Id*.

PTAB decisions, however, have now invalidated hundreds of claims in dozens of Masimo patents across many patent families.[1] The consistent thread across those decisions is a willingness to disregard the four corners of the references and rely on unsupported speculation and hindsight reconstruction. The Board errors at issue here led the Board to invalidate 92 Masimo claims. The Board's decisions are profoundly flawed and unsupported by substantial evidence. This Court should reverse those decisions.

[1] To date, the Board has also invalidated Masimo claims in IPR2020-01737, IPR2020-01733, IPR2020-01716, IPR2020-01713, IPR2020-01722, IPR2020-01715, IPR2020-01714, IPR2020-01539, IPR2020-01538, IPR2020-01537, IPR2020-01536, IPR2020-01526, IPR2020-01521, IPR2020-01520, IPR2020-01078, IPR2020-01054, IPR2020-01033, IPR2020-01019, IPR2020-01015, IPR2020-00967, IPR2020-00954, IPR2020-00912.

II. JURISDICTIONAL STATEMENT

The Board issued final written decisions in IPR195/209 on May 25, 2022, and in IPR193/208 on June 1, 2022. Appx00001-00085; Appx00086-00164; Appx00165-00241; Appx00242-00316. Masimo timely appealed these decisions on July 27, 2022. Appx01737-01739; Appx07041-07043; Appx12237-12239; Appx17359-17361. The Court has jurisdiction under 35 U.S.C. §§ 141(c), 319 and 28 U.S.C. § 1295(a)(4)(A).

III. STATEMENT OF THE ISSUES

1. Did the Board err by failing to reconcile in its analysis key prior art disclosures and admissions by Apple and its expert that undermine the Board's findings, resulting in unpatentability decisions unsupported by substantial evidence?

2. Did the Board err by (1) relying on arguments the Board itself raised without providing Masimo the opportunity to respond and (2) relying on the Board's own interpretations and theories unsupported by the record?

IV. STATEMENT OF THE CASE

A. Masimo's Claimed Inventions

The patents at issue arose from efforts to measure previously unmeasurable blood constituents through Masimo's Rainbow® technology. As the shared patent specification explains, the inventions are directed to noninvasive optical devices for "measuring a blood constituent or analyte, such as oxygen, carbon monoxide, methemoglobin, total hemoglobin," as well as "many other physiologically relevant patient characteristics." Appx00391 2:22-28.[2]

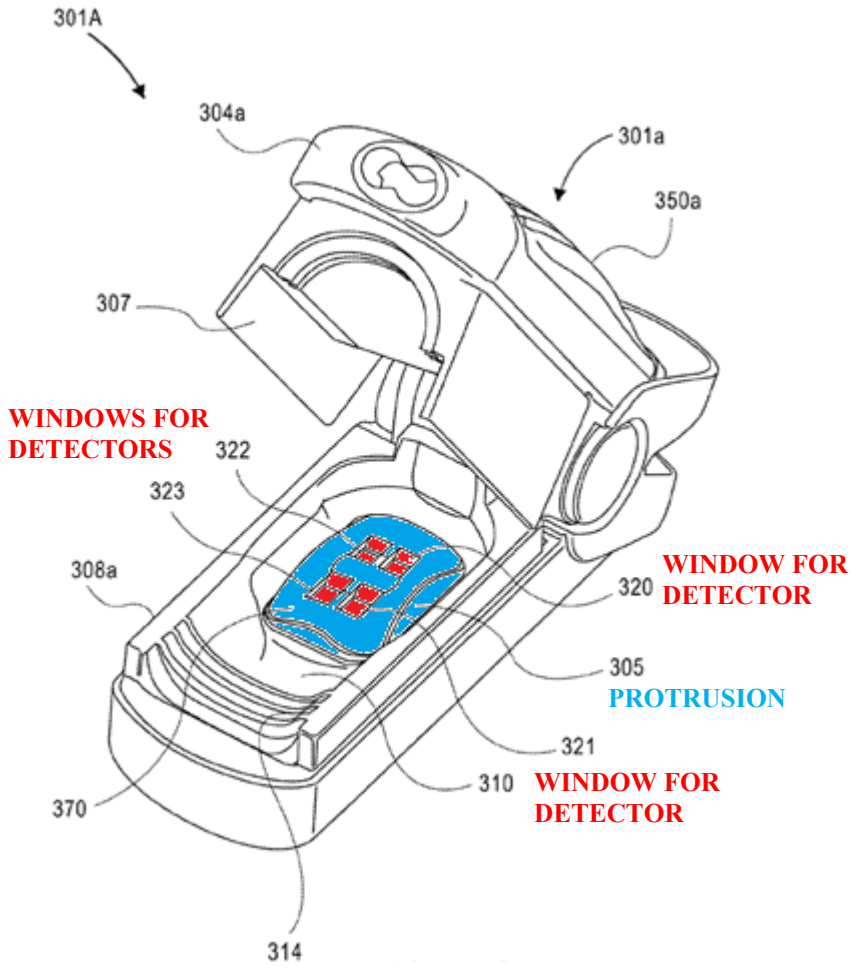
To detect parameters that are difficult to monitor optically and noninvasively, the inventors had to explore unconventional approaches. The inventors' research and development included thousands of hours of analysis, design, and experimentation, which culminated in unanticipated results and novel sensor structures.

The industry conventionally believed that pressure at the measurement site problematically displaced the desirable blood from the measurement site. *See*, *e.g.*, Appx02619 3:27-67. The inventors through experimentation found that a protrusion which applied pressure could—together with other unique features—provide signal improvement benefits. Those signal improvement benefits outweigh the drawbacks

[2] Masimo provides representative citations to the '708 patent in view of the shared patent specification unless otherwise noted.

of pressure and allow for measurement of blood constituents that are challenging to detect.

Masimo's Figure 3C (below) from the shared patent specification illustrates many features of such a device (301A), including a protrusion (305) and windows (320/321/322/323) for four detectors. Appx00333; Appx00400 19:18-28.



Masimo Patent Sensor Illustration Fig. 3C (color added, Appx00333)

Masimo's specification explains that the protruding surface thins out the measurement site, resulting in less light attenuation by the measured tissue. Appx00394 7:38-41. The protruding surface further increases the area from

which attenuated light can be measured. *Id*. 7:41-43. The multiple detectors allow for an averaging of measurements, which can reduce errors due to variations in the path of light passing through the tissue. Appx00395 9:7-12; *see also* Appx00392 3:6-16, 4:8-18. The patents explain that positioning the detectors "beneath the protrusion" (including under windows in certain embodiments) can reduce the "mean optical path length from the emitters to the detectors" such that the "accuracy of blood analyte measurement can increase." Appx00400 20:4-8.

The inventors discovered that these different components work together to provide greater noise cancellation and increase signal strength. Appx00395 9:7-12; Appx00400 20:4-20; *see also* Appx00392 3:6-16, 4:8-18. None of the prior art provides these teachings. The inventors even identified specific beneficial protrusion heights, explaining that a "convex bump of about 1 mm to about 3 mm in height" was found to "help signal strength by about an order of magnitude versus other shapes." Appx00400 20:8-12.

During prosecution, the examiners agreed the claimed combinations were a patentable advance unique in the field and "the prior art of record does not teach or suggest" Masimo's claims. Appx02085-02086; Appx07396-07397; Appx12582-12584; Appx17697-17699. No reference asserted in the IPRs discloses a physiological sensor with a convex cover positioned over multiple detectors (much less combined with the other claimed features).

All four patents share the same comprehensive specification and the same July 2008 priority date. Appx00317-00413; Appx00414-00510; Appx00511-00607; Appx00608-00704. The patent specification includes more than sixty pages of figures and twenty pages of detailed disclosure. *Id*. Given the extensive disclosure, Masimo unsurprisingly obtained a number of different claims directed to various disclosed features.

For example, while all patents claim aspects of a system that includes multiple detectors underneath a cover with a protrusion, the ’266 and ’191 patents further claim multiple emitters that emit light into tissue. Appx00412-00413; Appx00509-00510; Appx00606-00607; Appx00703-00704. The emitters may emit at different wavelengths to facilitate measurement of different and difficult-to-measure blood constituents. Appx00396-00397 11:52-13:29. The ’708 patent further claims a wall within which the at least four detectors are arranged. Appx00412-00413. The wall may control a positioning of the protrusion with respect to the detectors, enabling improved detection at the detectors. Appx00408 36:22-28.

Claim 1 of the ’266 patent illustrates features common to the claims:

1. A noninvasive optical physiological sensor comprising:

a plurality of emitters configured to emit light into tissue of a user;

a plurality of detectors configured to detect light that has been attenuated by tissue of the user, wherein the plurality of detectors comprise at least four detectors;

a housing configured to house at least the plurality of detectors; and

a lens configured to be located between the tissue of the user and the plurality of detectors when the noninvasive optical physiological sensor is worn by the user, wherein ***the lens comprises a single outwardly protruding convex surface configured to cause tissue of the user to conform to at least a portion of the single outwardly protruding convex surface*** when the noninvasive optical physiological sensor worn by the user and during operation of the noninvasive optical physiological sensor.[3] Appx00606.

B. The Board's Prior Art Combinations

The Board combined elements of one of two primary references (Aizawa (Appx02397-02403) or Mendelson-1988 (Appx02513-02519)) with elements of at

[3] Emphasis supplied unless otherwise noted.

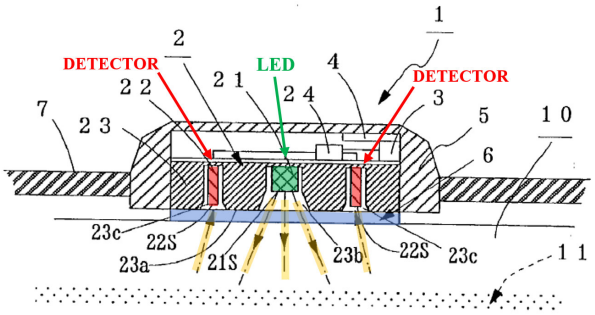
least one of two secondary references (Inokawa (Appx02404-02426, translation Appx02427-02450) or Ohsaki (Appx02507-02512)).[4]

1. Aizawa And Inokawa (IPR193/195/208/209)

All Board decisions combined Aizawa with Inokawa to invalidate claims of the '708, '190, '266, and '191 patents. Appx00083-00084; Appx00162-00163; Appx00239; Appx00315.

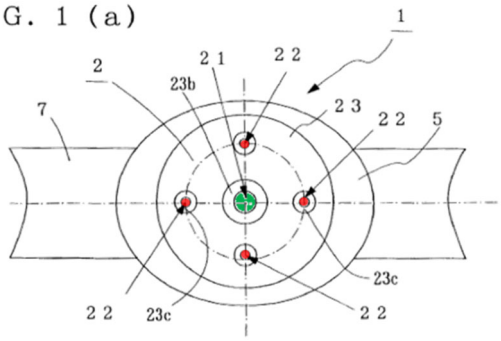
Aizawa discloses a circular sensor (below) for detecting a pulse. Appx02397-02399 Abstract, Figs. 1A-1B, 2. The sensor is worn on the wrist's palm-side and includes a "transparent plate-like member" (blue below) over four peripheral detectors (red below) around one centrally located LED (green below). Appx02402 ¶¶[0023], [0026].

[4] Masimo provides representative citations to exhibits in view of common exhibits across IPRs unless otherwise noted.

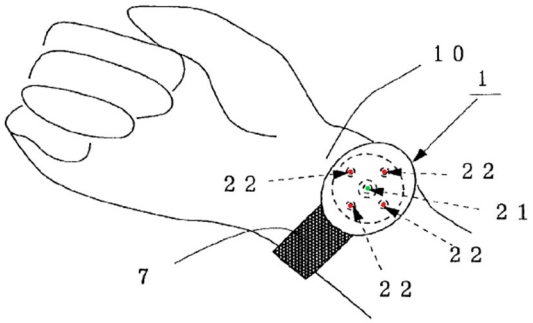


Aizawa Fig. 1B
(cross-sectional view)
(color added, Appx02398)

FIG. 1 (a)



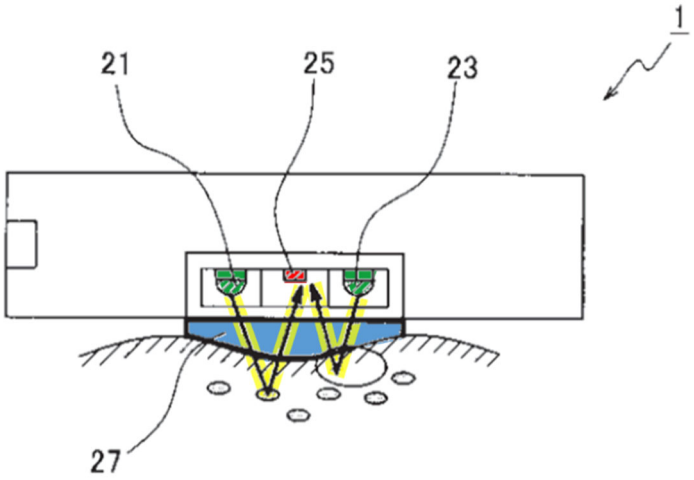
Aizawa Fig. 1A
(top view)
(color added, Appx02398)



Aizawa Fig. 2
(color added, Appx02399)

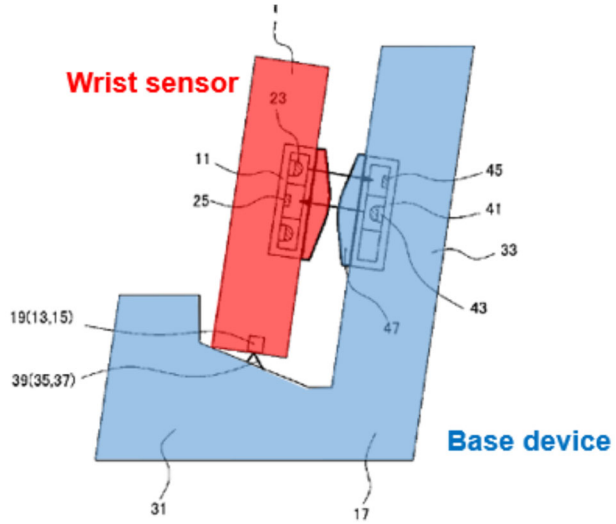
Aizawa discloses that its ***flat*** "plate-like member" is what "makes it possible to improve adhesion between the sensor and the wrist and thereby further improve the detection efficiency of pulse waves." Appx02401 ¶[0013].

Inokawa's sensor (below) has the opposite detector/emitter configuration. Inokawa's emitters (green below) are located on the sensor's ***periphery*** and its single detector (red below) is located in the sensor's ***center***. Appx02437 ¶[0058]; Appx02445 Fig. 2. Inokawa places a convex cover or "lens" (blue below) over the emitters and single detector. *Id*.



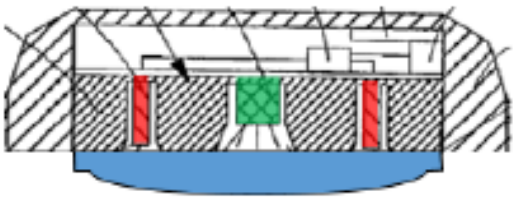
Inokawa Fig. 2 (cross-sectional view) (color added, Appx02445)

Inokawa also addresses a different objective from Aizawa—communicating data. Appx02432. Specifically, Inokawa discusses the problems of previous data transmission systems and proposes communicating data by placing its physiological sensor (red below) on a base station (blue below) to optically communicating data via LED light. *Id.*; Appx02445 Fig. 3.



Inokawa Fig. 3 (color added, Appx02445)

The Board adopted Apple's combination (below), which substitutes Aizawa's flat plate with a modified version of Inokawa's convex cover. Appx00039; Appx00123; Appx00216; Appx00292-00293.



Aizawa-Inokawa Combination (*Id.*)

The Board found a POSITA would have been motivated to add Inokawa's lens to Aizawa's sensor to enhance light collection. *Id*. But Apple and its expert repeatedly admitted that the convex cover in this combination would concentrate light toward the ***center*** of the sensor. Appx06494-06495; Appx07532-07534 ¶¶106-108; Appx10408 204:1-20. Thus, as Masimo's expert explained, the combination would direct light ***away*** from the peripheral detectors and ***decrease*** light collection. Appx04811-04814 ¶¶50-52; Appx10127-10130 ¶¶48-50; Appx15012-15015 ¶¶48-50; Appx20081-20084 ¶¶48-50. The Board's combination also contradicts Aizawa's express teaching to use a ***flat*** plate for improved detection efficiency. Appx02401 ¶[0013].

2. Aizawa And Ohsaki (IPR193)

One Board decision combined Aizawa with Ohsaki to invalidate claims of the '708 patent.[5] Appx00083-00084.

Unlike Aizawa's ***palm-side*** sensor, Ohsaki discloses a sensor that "is worn on the ***back side*** [i.e., watch side] of a user's wrist corresponding to the back of the user's hand." Appx02507 Abstract. Ohsaki explains that its cover or "board" prevents slipping on the wrist's backside, but if placed on the wrist's palm-side (at Aizawa's measuring location), it "has a tendency to ***slip off*** the detecting position." Appx02511 ¶¶[0023]-[0024]; Appx02509 Figs. 3A-3B.

Masimo's expert explained, based on Ohsaki's disclosure, how Ohsaki's longitudinal structure reduces slipping by fitting within an anatomical opening on the backside of the user's wrist. Appx04835-04837 ¶83; Appx02510-02511 ¶¶[0006], [0019]. The Board's combination required a POSITA to change Ohsaki's longitudinal board to a circular cover to match Aizawa's sensor, eliminating the longitudinality that Ohsaki expressly explains is important to reduce slipping. Appx02511 ¶[0019]. The Board's combination also required a POSITA to place Ohsaki's convex surface on the wrist's ***palm-side***, which Ohsaki taught would cause

[5] The Board chose not to evaluate the merits of this combination with respect to the '190, '266, and '191 patents because the Board "conclude[d] that the challenged claims are unpatentable on other grounds." Appx00162-00163; Appx00239; Appx00315.

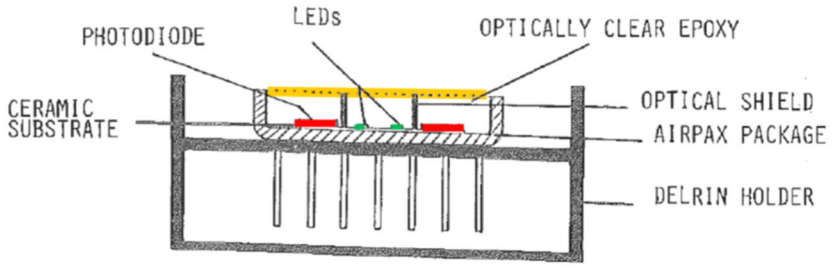
the convex surface to ***slip off***, ignoring that Aizawa says to use a ***flat*** plate at its palm-side location. Appx04835-04837 ¶83.

The Board's combination also placed a protrusion over peripheral detectors. Appx00039; Appx00123; Appx00216; Appx00292-00293. As discussed, however, Apple and its expert repeatedly admitted that the convex cover in such a combination would concentrate light ***centrally*** and thus away from the peripherally located detectors. *See supra* Section IV.B.1. Moreover, the Board's combination contradicts Aizawa's express teaching to use a flat plate for improved detection efficiency. Appx02401 ¶[0013].

3. Mendelson-1988 And Inokawa (IPR193/195/208/209)

All Board decisions combined Mendelson-1988 with Inokawa to invalidate claims of the '708, '190, '266, and '191 patents. Appx00083-00084; Appx00162-00163; Appx00239; Appx00315.

Mendelson-1988 discloses a sensor that measures oxygen saturation from a user's forehead. Appx02513; Appx00065. Mendelson-1988's sensor (below), like Aizawa's sensor, positions detectors around a central light source. Appx02514-02515.



Mendelson-1988 Fig. 2B (cross-sectional view) (color added, *id.*)

The Board found that Inokawa would have motivated a POSITA to add Inokawa's lens to Mendelson-1988's sensor to improve light detection. Appx00074; Appx00149-00150; Appx00231; Appx00311. As discussed, however, Apple and its expert repeatedly admitted that the convex cover in such a combination would concentrate light ***centrally*** and thus away from the peripherally located detectors. *See supra* Section IV.B.1.

V. SUMMARY OF THE ARGUMENT

1. In IPR193/195/208/209, the Board found a POSITA would have added a protrusion to a flat sensor surface to improve "light collection," but the prior art, Apple's admissions, and evidence established the opposite. The Board erred by failing to reconcile its decisions with Apple's admissions. The Board instead adopted a new theory that is unsupported by substantial evidence. The Board additionally found a reasonable expectation of success without a clear evidence-based explanation of the combinations.

2. In IPR193, the Board found a POSITA would have added a protrusion to a flat sensor surface to prevent slippage when the prior art, Apple's admissions,

and evidence established the opposite. The Board erred by failing to reconcile its decision with the prior art's express disclosures and by adopting a new theory for the first time in its decision. The Board's resulting decision is unsupported by substantial evidence.

VI. STANDARD OF REVIEW

The Board's "determination of obviousness under § 103 is a question of law." *SightSound Techs., LLC v. Apple Inc.*, 809 F.3d 1307, 1318 (Fed. Cir. 2015). The Board's factual findings are reviewed for substantial evidence and its legal conclusions are reviewed de novo. *Id.*

VII. ARGUMENT

A. The Board's Finding That Inokawa Would Have Motivated A POSITA To Add A Protrusion To Aizawa's Sensor To Improve Light Collection Is Unsupported By Substantial Evidence

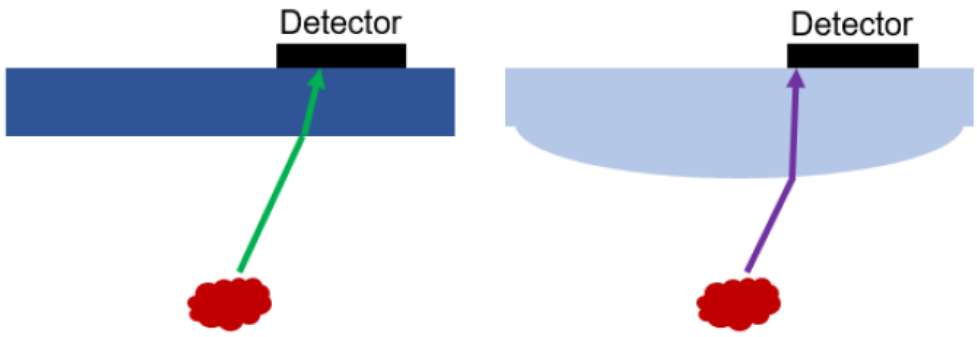
The Board found in IPR193/195/208/209 that Inokawa would have motivated a POSITA to add a convex surface to Aizawa's flat cover to improve light collection. Appx00039; Appx00123; Appx00216; Appx00292-00293. The Board's finding is erroneous and unsupported by substantial evidence.

1. The Board Erred By Failing To Reconcile Apple's Admissions

The Board erred by failing to reconcile Apple and its expert's admissions in its analysis. Apple and its expert repeatedly admitted that a POSITA would believe a convex surface condenses light ***centrally***, and thus away from peripherally located detectors. Appx004966-04967 83:15-84:2; Appx04969-04970 86:19-87:1. But the

Board did not reconcile these numerous admissions with its finding that "it would have been obvious to modify Aizawa's cover 6 to include a convex lens or protrusion like that taught in Inokawa, in order to increase the amount of backscattered light that will be received by Aizawa's four peripheral detectors." Appx00036; Appx00121; *see also* Appx00213; Appx00290.

Apple and its expert asserted: (1) "the incoming light is 'condensed' toward the center," (2) the combination's convex surface would result in "more light in the center than at the outer edge," and (3) "that's because light's being directed towards the center and away from the edge…." Appx06494-06495; Appx07532-07533 ¶107; Appx05087 204:1-20. Apple's expert even illustrated that a convex cover (below right) redirects light centrally compared to a flat cover (below left):



Apple's Illustrations of Light-Redirection (Appx07533)

Apple's expert explained that the above-right illustration shows "the incoming light is 'condensed' toward the center." Appx07532-07533 ¶107.

Apple's admissions should have been fatal to all combinations. ***Every*** combination in all four IPRs has peripheral detectors arrayed around a centrally located emitter. Appx04817-04818 ¶58; Appx04843 ¶94; Appx10133-10134 ¶56; Appx10160-10161 ¶94; Appx15018-15019 ¶56; Appx15050-15051 ¶103; Appx20087-20088 ¶56; Appx20120 ¶103. As Masimo's expert explained, consistent with Apple's admissions and a POSITA's understanding of how a convex surface impacts light, a POSITA would have believed that the Board's convex surface would direct light ***away*** from the peripherally located detectors, ***decreasing*** light collection and degrading sensor performance. Appx04817-04823 ¶¶58-65; Appx10133-10141 ¶¶56-65; Appx15018-15026 ¶¶56-65; Appx20087-20095 ¶¶56-65.

Moreover, the combinations all placed the LEDs and detectors in the ***opposite*** configuration of Inokawa. While Inokawa discloses a single detector in the center with LEDs on the periphery, the combinations placed one or more LEDs in the center, with detectors on the periphery. Apple's expert admitted Inokawa disclosed ***no*** obvious benefit for different sensor/detector configurations:

> I think one of ordinary skill in the art would understand that in Inokawa the objective is to concentrate light at the ***detector***, which is in the ***center axis*** of the drawing and that the lens is capable of providing that benefit. If we're going to ***move the lenses and the LEDs and detectors around*** and ask different questions, it's – ***it isn't so obvious*** that Inokawa is specifically considering those scenarios. It's a little more hypothetical.

Appx04969-04970 86:19-87:6. Apple's expert was correct—any alleged benefit of Inokawa's lens "isn't so obvious" when changing the placement of the detectors.

The Board's failure to reconcile Apple's admissions with the Board's decisions justifies reversal or remand. *See Cook Grp. v. Bos. Sci. Scimed, Inc.,* 809 F. App'x 990, 999 (Fed. Cir. 2020) (nonprecedential) ("The Board erred in refusing to consider [petitioner's] admission[s] when it was weighing the evidence…."); *PPC Broadband, Inc. v. Iancu,* 739 F. App'x 615, 622-23 (Fed. Cir. 2018) (nonprecedential) (vacating obviousness where Board failed to address expert's admissions). "The Board's selective weighing of the record evidence does not pass muster under the APA. Just as it may not short-cut its legal analysis, the Board may not short-cut its consideration of the factual record before it." *Applications in Internet Time, LLC v. RPX Corp*., 897 F.3d 1336, 1353 (Fed. Cir. 2018). "[A]n agency's refusal to consider evidence bearing on the issue before it is, by definition, arbitrary and capricious…." *Aqua Prods. v. Matal*, 872 F.3d 1290, 1325-26 (Fed. Cir. 2017).

2. The Board's Adoption Of The "Most Pronounced Curvature" Theory Is Unsupported By Substantial Evidence

Rather than reconcile Apple's numerous admissions, the Board adopted one of the many new theories Apple asserted after Apple discovered the flaw in its combinations. Apple's many new theories included that: (1) light would increase at

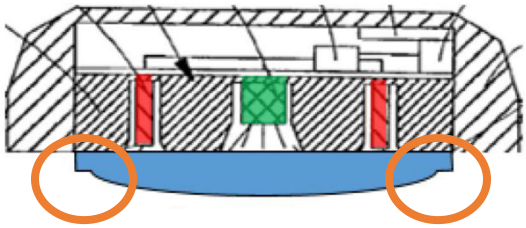
certain locations (including somehow at least at the detectors), Appx05024-05026 141:22-143:5; (2) light would increase everywhere under the convex surface, Appx05047 164:8-16; (3) the convex surface would capture more light overall than a flat surface (the "additional light-capture" theory), Appx05087-05088 204:21-205:12; (4) the path of light is "reversible" in a physiological sensor such that switching emitters and detectors would have no impact on optics (the "reversibility" theory), Appx03564-03569 ¶¶10-18, Appx08879-08884 ¶¶10-18, Appx13765-13770 ¶¶10-18, Appx18834-18839 ¶¶10-18; and (5) light concentration would improve at Aizawa's detectors because of where the combination's "lens's curvature is most pronounced" (the "most pronounced curvature" theory)[6], Appx00040, Appx00124-00125, Appx00217-00218, Appx00294.

None of these theories were in Apple's petitions, and the theories contradict Apple's expert's initial position and repeated admissions. The Board nonetheless adopted the "most pronounced curvature" theory without reconciling it with Apple's initial position and admissions, or Apple's many other inconsistent theories.

[6] In related IPR proceedings, the Board found that light concentration would improve at Aizawa's detectors because of where the illustrated "curvature of [Apple's] lens surface is the greatest" (the "greatest curvature" theory). *See, e.g., Apple Inc. v. Masimo Corp.*, No. IPR2020-01520, 2022 WL 557896, at *21 (P.T.A.B. Feb. 23, 2022). The Board nowhere explained if or how the "greatest curvature" theory differs from the "most pronounced curvature" theory.

Appx00038-00040; Appx00122-00125; Appx00215-00218; Appx00292-00294.[7] To support the "most pronounced curvature" theory, the Board ascribed remarkable geometrical precision to Apple's figures, analyzing the figures as illustrating the "most pronounced" curvature "near" the detectors. *Id*. But Apple's expert refused to ascribe precision to those figures, calling them "cartoons." Appx06213-06214 20:17-21:1; Appx06397-06398 204:22-205:1.

Moreover, if anything, Apple's petition figures illustrate the "most pronounced" curvature well ***beyond*** the narrow detector cavities:

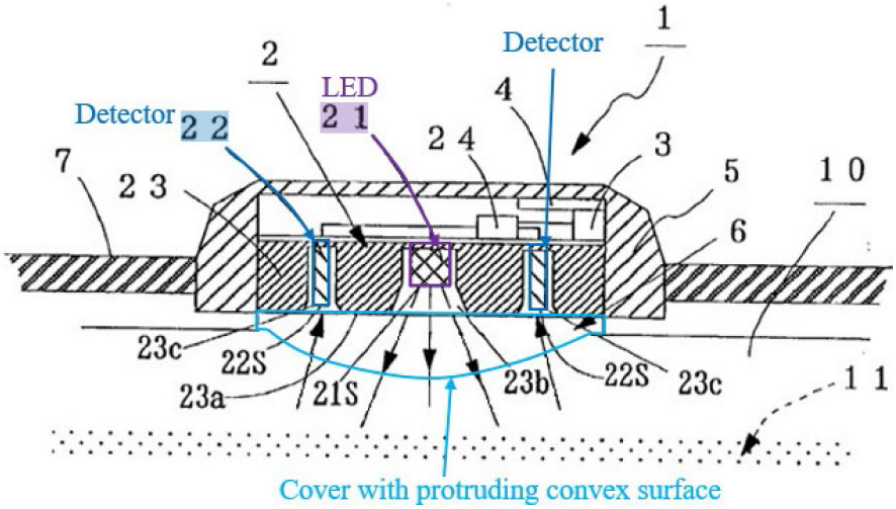


Aizawa-Inokawa Combination
(annotated to highlight alleged "most pronounced" curvature) (Appx00039)

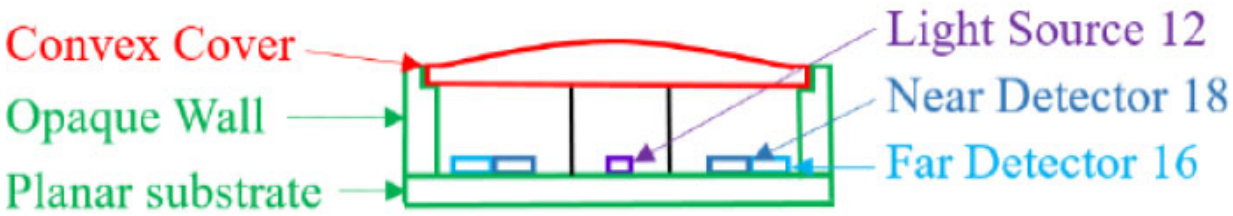
No evidence showed that the combination's "most pronounced" curvature was sufficiently "near" the detectors to increase light as compared to a flat surface. As shown below, Apple's many petitions filed against Masimo's patent family illustrated different lens shapes, irrespective of the position of any "most

[7] The Board also stated without explanation that it was "persuaded by" Apple's expert's deposition testimony and remarks on reply regarding the "additional light-capture" theory. *See e.g.*, Appx00039.

pronounced" curvature relative to the detectors, while similarly arguing the combinations would improve light collection:



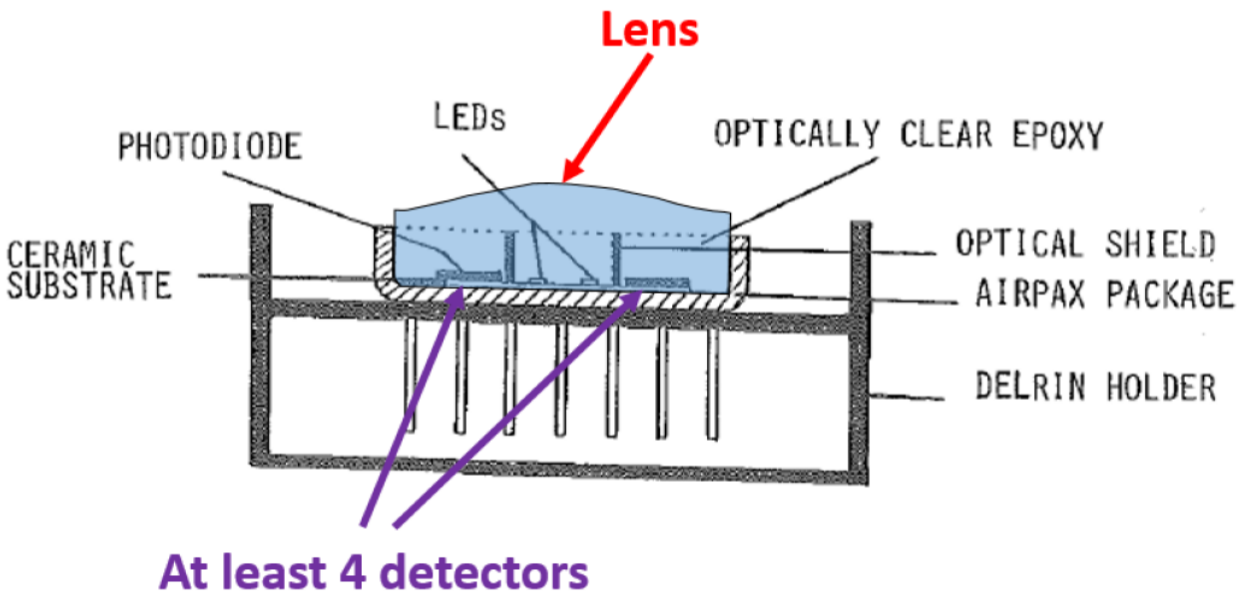
Another Aizawa-Ohsaki Combination[8]



Mendelson-799-Ohsaki Combination[9]

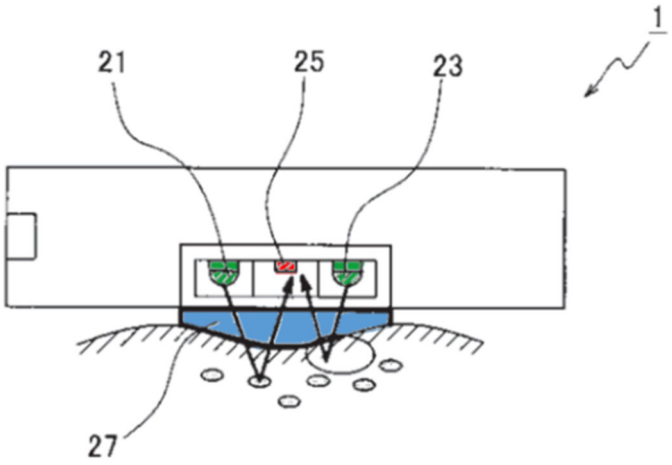
[8] *Apple Inc. v. Masimo Corp.*, No. IPR2020-01713, 2021 WL 1823926, at *9 (P.T.A.B. May 5, 2021).

[9] *Apple Inc. v. Masimo Corp.*, No. IPR2020-01536, 2022 WL 562452, at *13 (P.T.A.B. Feb. 23, 2022). Mendelson-799 is a reference cited by Apple in IPR193/195/208/209. Appx01284-01285; Appx06573-06575; Appx11867-11868; Appx17010-17011.



Mendelson-1988-Inokawa Combination in IPR208 (Appx12773)

The Board examined Inokawa's Figure 2 and found that "[i]n Inokawa the lens's curvature is most pronounced at the center of the lens near the central detector." Appx00040; Appx00125; Appx00217; Appx00294. But Inokawa never suggests the "curvature is most pronounced at the center of the lens near the central detector." Nor does Inokawa disclose such "most pronounced" curvature increases light collection, or that it would somehow increase light around the sensor's periphery, as required by the alleged motivation to combine.



Inokawa Fig. 2 (color added, Appx02445)

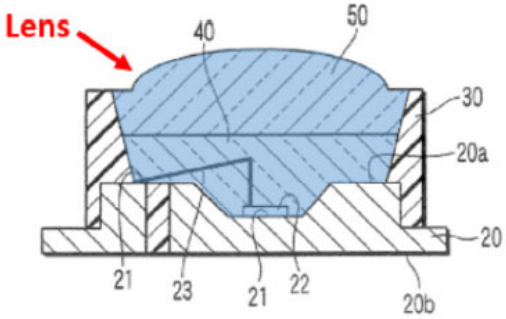
Indeed, Apple's expert never identified any "most pronounced" curvature in Inokawa's Figure 2. Apple's expert testified that "the lens design in Inokawa is ***not*** actually a lens design. It's a -- just a ***cartoon*** showing the lens." Appx06411 218:15-17; *see also* Appx05224-05225 341:22-342:6 (characterizing Inokawa's and Aizawa's drawings as "cartoons"); Appx06408 215:11-13; Appx04969-04670 86:19-87:6 (Apple's expert explaining the alleged benefit of Inokawa's lens "isn't so obvious" when changing placement of detectors).

Apple's expert testified there is "***not*** enough information in [Inokawa's] drawing to identify a precise location or any particular precision around the concentration of the light." Appx04957 74:10-15. Apple's expert testified that "one would do some work" to understand the "light paths" and then choose "a particular shape which might depart from the ***cartoon*** shape" of Inokawa to "arrive at a beneficial arrangement for a particular arrangement of detectors and emitters." Appx06411-06412 218:7-219:4; *see Star Sci., Inc. v. R.J. Reynolds Tobacco Co.,*

655 F.3d 1364, 1376 (Fed. Cir. 2011) (prior art's "speculative and tentative disclosure of what might or may [cause a desired effect] does not sufficiently direct or instruct one of skill in this art").

By interpreting Inokawa in a manner unsupported by evidence and inconsistent with Apple's expert's testimony, the Board improperly "substituted its own expertise for record evidence that [patent challenger] was obligated to provide…." *Brand v. Miller*, 487 F.3d 862, 869, 870 (Fed. Cir. 2007) (reversing Board's obviousness decision). That is error. *See id*.

Indeed, far from placing the "most pronounced" curvature "near" the detectors, the Board acknowledged that the shape of the combination's convex lens was "motivated" or "inspired by" Nishikawa (Appx02598-02605), a ***non-combination*** reference. Appx00041; Appx00125; Appx00218; Appx00295.[10]



Apple's Expert's Illustration of Nishikawa's LED (Appx02209-02210 ¶89)

[10] In a related IPR proceeding, the Board stated Apple "borrowed" the "specific shape of the convex lens" from Nishikawa. *Apple Inc. v. Masimo Corp.*, No. IPR2020-01520, 2022 WL 557896, at *21 (P.T.A.B. Feb. 23, 2022).

Nishikawa describes an ***LED*** lens, ***not*** a lens covering multiple ***detectors*** in a physiological sensor. Appx02598 Abstract. No evidence explained why a POSITA would have used Nishikawa's curvature, which directs ***outgoing*** light from an LED, to design the cover of a physiological sensor monitoring ***incoming*** light.

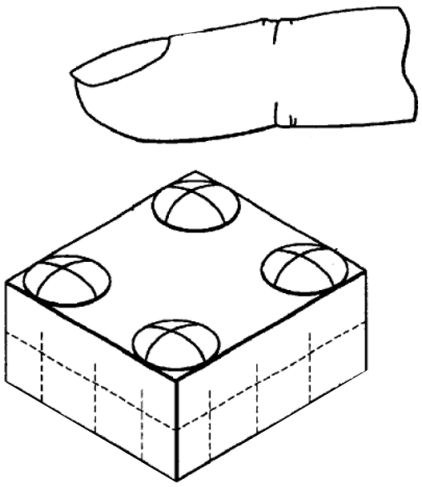
The Board accepted that the combination adopted its shape from Nishikawa, despite ***no*** evidence of any motivation to combine Nishikawa with the other references. Appx00041-00042; Appx00125-00127; Appx00218-00220; Appx00295-00297. The Board cited unsupported testimony from Apple's expert that Nishikawa's lens "is intended to provide curvature in the lens where it can ***do the most good***…." *Id*. But that assumes some teaching of where "the most good" would be, which is nowhere in Nishikawa or any other record prior art. Moreover, "do the most good" is not a valid motivation. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (insufficient evidence of obviousness where expert testified "motivation to combine would be because you wanted to build something better").

Further, Apple's expert admitted that, even under the "most pronounced curvature" theory, some light rays "that would have hit the detectors" with a flat surface are "refracted away from the detectors" by a protrusion. Appx06212-06214 19:16-21:8. Neither Apple's expert nor the Board accounted for the decrease in light from "refracted away" light caused by changing a flat surface to a protruding surface.

Apple's expert further admitted that light decreases exponentially when moving away from the emitter. Appx06242-06243 49:1-50:13; Appx06250 57:10-22. But Apple's expert provided no analysis of how this exponential decrease would affect the "most pronounced curvature" theory, such that a "most pronounced" curvature "near" the edge would have any significance at all. Even under the Board's flawed reasoning, a POSITA would have had no motivation to add a protrusion to increase a weaker light signal collectable from the far edge of the sensor at the expense of reducing the stronger light signal that is collectable near the center of the sensor closer to the light source.

The Board also failed to explain why the "most pronounced curvature" theory would have led a POSITA to place a ***single*** protrusion over ***multiple*** detectors. If anything, a POSITA seeking to place the "most pronounced" curvature "near" detectors would have placed a protrusion over ***each*** detector to collect light to each detector, as expressly taught in the prior art. Indeed, the examiners cited art that placed a convex surface over each detector (illustrated below[11]):

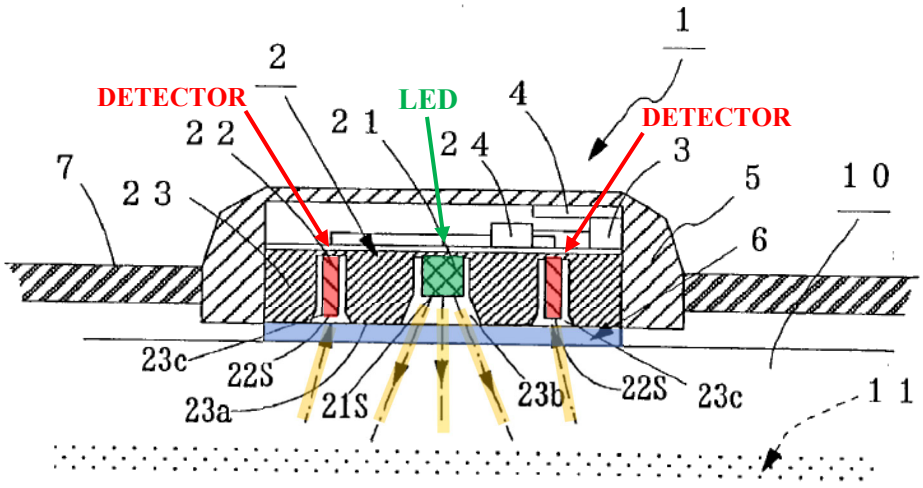
[11] Adapted from Chaiken (U.S. Patent No. 6,223,063).



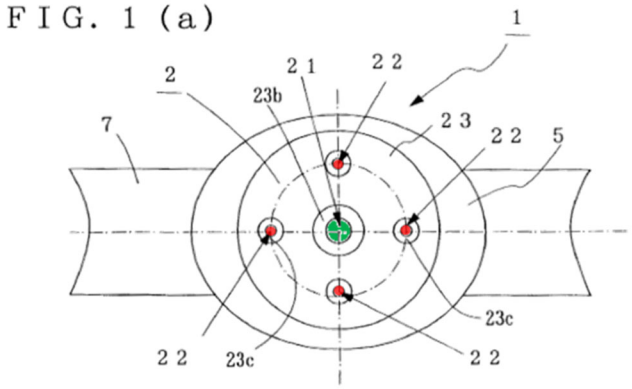
In the reasons for allowance, the examiners found individual protrusions over individual detectors did not disclose or suggest Masimo's approach of a ***single*** protrusion over ***multiple*** detectors. Appx02085-02086; Appx07396-07397; Appx12582-12584; Appx17697-17699. No evidence explains why the "most pronounced curvature" theory would lead a POSITA to a ***single*** protrusion over multiple detectors. If anything, the "most pronounced curvature" theory would instead lead to the prior art configuration illustrated above, with one lens over each detector, placing the "most pronounced" curvature over each detector.

The Board must "articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *In re Nuvasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016). The Board erred by failing to do so. Indeed, adding a single protrusion would have disrupted Aizawa's approach to monitoring. Aizawa places narrow tapered openings over its detectors to collect

light reflected from arteries and uses multiple such opening/detectors to ensure at least one detector is near an artery during use, Appx02402 ¶¶[0022]-[0027]:



Aizawa Fig. 1B (cross-sectional view) (color added, Appx02398)



Aizawa Fig. 1A (top-down view) (color added, *id.*)

As Apple's expert explained, light has to "***somehow*** find those tapered openings" in Aizawa's sensor to reach the detectors. Appx05140 257:11-18.

Placing a single protrusion over ***all*** detectors would fundamentally disrupt Aizawa's optics by redirecting light centrally and away from the narrow openings. The Board identified no evidence explaining why a POSITA would have disregarded

Aizawa's specific disclosure to use a ***flat*** plate for improved detection efficiency. Moreover, the Board identified no evidence explaining why a POSITA would have chosen a ***single*** protrusion over placing individual lenses over individual openings/detectors as taught in other prior art.

The Board also found that a POSITA was a person having "a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information." Appx00101; Appx00180; Appx00256-00257; *see also* Appx00011-00012. The Board further stated "[a]lternatively, the person could have also had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline." *Id*. This description of a POSITA's knowledge includes ***no*** specialized education or work experience in optics, much less optics for physiological monitoring.

No references show the "most pronounced curvature" theory is even a valid optics theory, much less a "general concept[] of optics" known to a POSITA with ***no*** optics training. Appx00044; Appx00128; Appx00221; Appx00298. Any such concept was apparently unknown to Apple and its expert when Apple filed its petitions, which did not mention that theory. Apple and its expert instead relied on the straightforward understanding that a protrusion acts as a lens and concentrates

light ***centrally***. *See, e.g.,* Appx05087 204:1-20; Appx04966-04967 83:15-84:2; Appx04969-04970 86:19-87:1. Despite decades of lens research cited by Apple, the Board and Apple cited no example where a POSITA increased light in a physiological sensor at peripheral detectors under a single protrusion. *See Brand*, 487 F.3d at 869-70 ("[T]he path that the Board determined that a skilled artisan would follow has, so far as the record reflects, never been followed.").

The Board thus erred in finding a POSITA would have been motivated to add a single protrusion over multiple peripheral detectors in a physiological sensor. This fundamental flaw exists in and undermines ***all*** combinations in ***all*** four IPRs.

Accordingly, this Court should reverse the Board's combination of Aizawa and Inokawa.

B. The Board's Finding That Ohsaki Would Have Motivated A POSITA To Add A Protrusion To Aizawa's Sensor To Prevent Slippage Is Unsupported By Substantial Evidence

The Board found in IPR193 that Ohsaki would have motivated a POSITA to add a convex surface to Aizawa's sensor to prevent slippage.[12] Appx00053. Even if such a motivation existed, however, nothing showed this motivation would have led a POSITA to create an optically ***flawed*** sensor that directs light ***away*** from its peripheral detectors. *See supra* Section VII.A.

[12] The Board chose not to evaluate the merits of this combination in IPR195/208/209 because the Board "conclude[d] that the challenged claims are unpatentable on other grounds." Appx00162-00163; Appx00239; Appx00315.

1. The Board Erred By Failing To Reconcile Its Decisions With Ohsaki's "Tendency To Slip Off" Disclosure

Regardless, the Board erred by finding a motivation to combine based on preventing slippage without reconciling that finding with Ohsaki's disclosure that its convex surface has a "tendency to ***slip off***" at Aizawa's palm-side measurement location. Appx02511 ¶[0023]; s*ee Chemours Co. v. Daikin Indus.*, 4 F.4th 1370, 1376 (Fed. Cir. 2021) (reversing where Board did not "adequately grapple" with why POSITA would have made modification given prior art's express disclosure); *Polaris Indus. v. Arctic Cat, Inc.,* 882 F.3d 1056, 1069 (Fed. Cir. 2018) ("a reference 'must [be] considered for all it taught, [including] disclosures that diverged and taught away from the invention at hand'"). "[T]he Board may not short-cut its consideration of the factual record before it." *RPX*, 897 F.3d at 1353.

Rather than consider Ohsaki's "tendency to slip off" disclosure in paragraph 23 (Appx02511 ¶[0023]), the Board broadly interpreted Ohsaki's paragraph 25 as supporting that any convex surface would generally provide increased adhesion compared to a flat surface (*Id*. ¶[0025]). But Ohsaki's paragraph 25 compares the performance of a convex surface to a flat surface on the wrist's backside (i.e., ***watch side***), as shown in Figures 4A-4B. *Id*.; Appx05491-05492 156:18-157:4; Appx04835-04839 ¶¶83-85. Nothing in Ohsaki teaches that its convex surface provided any adhesion benefit over a flat surface at any ***other*** location.

Ohsaki illustrates with Figures 3A-3B (below) undesirable variation in a sensor signal when using its protrusion on the wrist's palm-side, which is where Aizawa's sensor must be placed to be close to arteries. Appx02509 Figs. 3A-3B; Appx02511 ¶¶[0023]-[0024]; Appx02397-02398 Abstract, Figs. 1A-1B; Appx02401-02402 ¶¶[0013], [0023], [0026]; Appx04835-04839 ¶¶83-85.

FIG. 3A

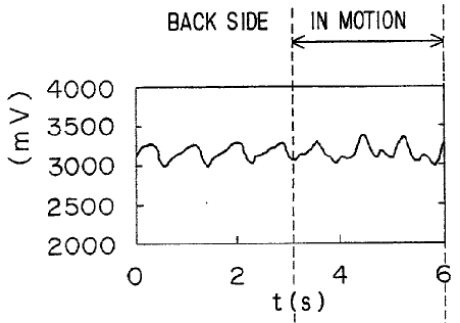
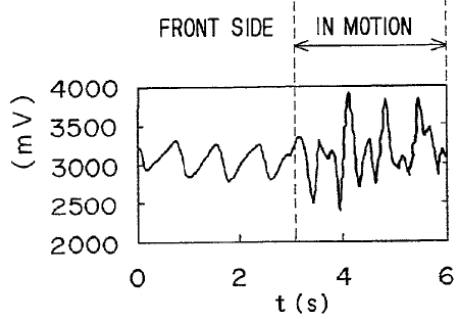


FIG. 3B



Ohsaki Figs. 3A (protrusion on backhand side), 3B (protrusion on palm-side)

The Board erroneously dismissed Ohsaki's Figures 3A-3B, reasoning that, because Ohsaki's "tested device incorporates a convex protrusion in both instances, Figures 3A-3B," Ohsaki does not show that a convex protrusion would provide ***no*** benefit on the palm-side. Appx00052-00053. But it was ***Apple's*** burden to show Ohsaki ***disclosed*** some benefit to using a protrusion at Aizawa's palm-side location. By requiring Masimo to prove that Ohsaki's protrusion would have ***no*** benefit on

the palm-side, the Board improperly shifted the burden to Masimo. *See In re Magnum Oil Tools Int'l, Ltd.,* 829 F.3d 1364, 1377 (Fed. Cir. 2016) (reversing where Board "improperly shifted the burden to [the patentee]"). Apple's expert never rebutted Masimo's expert's interpretation of Figures 3A-3B. *See Wireless Protocol Innovations*, *Inc. v. TC Mobile, Inc.,* 771 F. App'x 1012, 1017 (Fed. Cir. 2019) (nonprecedential) (reversing for lack of substantial evidence where "the Board cited no reasonable support for its reading of Figure 9").

A POSITA reviewing Ohsaki, including Figures 3A-3B, would have found no reason to place Ohsaki's protrusion on a palm-side sensor. Indeed, Ohsaki directly connects Figure 3B with its teaching that a protrusion on the palm-side has a "tendency to slip off." Appx02511 ¶[0023]. Ohsaki first explains the benefits of measuring on the wrist's palm-side, explaining (consistent with the proximity to blood-filled arteries) that the received light would be greater. *Id.* Ohsaki then explains, however, that on the palm-side:

> ***the detecting element 2 has a tendency to slip off the detecting position of the user's wrist 4 as the user moves his/her wrist***, and therefore the intensity of the light received by the light receiving element 7 largely varies depending on the shift amount of the detecting element 2. ***As shown in FIG. 3B***, in the case that the detecting element 2 is arranged on the front side of the user's wrist 4, the pulse wave can be detected well if the user is at rest. However, ***when the user is in motion, the detected pulse wave is adversely affected by the movement of the user's wrist 4***.

Id. A POSITA would have read Ohsaki as a whole and understood that Ohsaki (and specifically Figure 3B) teaches the undesirability of placing a protrusion on the palm-side.

The Board also "credited" Apple's expert's testimony on reply that a protrusion improves adhesion "even in Aizawa's arrangement" because the protrusion will allegedly "physically extend[] into the tissue and displac[e] the tissue…." Appx00050-00051 (quoting Appx03579-03580 ¶37). But that testimony contradicts ***both*** (1) Aizawa, which teaches that a ***flat*** plate on the wrist's palm-side improves adhesion and (2) Ohsaki, which teaches that its protrusion slips on the palm-side. Unsupported expert testimony that contradicts the prior art is not substantial evidence. *See Ericsson Inc. v. Intellectual Ventures I LLC,* 890 F.3d 1336, 1346 (Fed. Cir. 2018).

The Board additionally found the alleged reduced slippage from Ohsaki's convex surface would have also "improve[d] the pulse sensor's ability to emit light into and detect light reflected from the user's wrist, to generate a pulse signal." Appx00051-00052. As discussed, however, a POSITA would not have believed Ohsaki's convex surface would prevented slippage at Aizawa's palm-side location in the first place, much less provided any additional alleged benefit flowing from preventing slippage on the wrist's palms-side. Aizawa expressly teaches its ***flat*** plate improves detection efficiency on the wrist's palm-side. Appx02401 ¶[0013].

The Board identified no reason Aizawa's flat plate, disclosed as already providing improved detection efficiency, would be insufficient and should be replaced with a convex surface that Ohsaki says slips at Aizawa's palm-side measurement location.

2. The Board Erred By Adopting Its Own Theory For The First Time In Its Decision

Even if Ohsaki could be interpreted as disclosing that its convex surface prevents slippage, Aizawa explains that its sensor already obtains improved adhesion with its ***flat*** surface. Appx02401 ¶[0013]. Aizawa discloses that "a transparent ***plate***-like member" is what "makes it possible to improve adhesion between the sensor and the wrist and thereby further improve the detection efficiency of pulse waves." *Id*.

The Board discarded Aizawa's teaching that its flat cover provides improved adhesion. The Board instead adopted its own theory for the first time in the decision: that Aizawa's "improved adhesion is provided by the acrylic material of plate 6, not the flat surface of the plate." Appx00053-00054. But the "Board must base its decision on arguments that were advanced by a party, and to which the opposing party was given a chance to respond." *In re Magnum*, 829 F.3d at 1381.

Apple's own expert testified that (1) Aizawa's "plate is described as a plate-like member. It doesn't explicitly require the use of acrylic" (Appx05017 134:9-14); and (2) a POSITA would understand you can get Aizawa's benefit by using acrylic ***or*** "other" materials (Appx05015-05016 132:19-133:9). Aizawa's disclosure

itself makes clear that Aizawa's flat plate, not its acrylic material, improves adhesion. Appx02401 ¶[0013]. The Board's new theory thus contradicted Aizawa's teachings and Apple's expert's testimony. Accordingly, this Court should reverse the Board's combination of Aizawa and Ohsaki.

C. The Board's Finding That Inokawa Would Have Motivated A POSITA To Add A Protrusion To Mendelson-1988's Sensor To Increase Light Collection Is Unsupported By Substantial Evidence

The Board also found in IPR193/195/208/209 that Inokawa would have motivated a POSITA to add a protrusion to a forehead sensor in a different reference, Mendelson-1988, to increase light collection. Appx0074; Appx00149-00150; Appx00231-00232; Appx00311. The Board stated its "reasoning [was] substantially identical to the analysis provided above in connection with the ground based on Aizawa and Inokawa, with Mendelson-1988 replacing Aizawa in the combination." *Id*. The Board's decision lacks substantial evidence for the same reasons as those identified above with respect to Aizawa and Inokawa. *See supra* Section VII.A. Mendelson-1988's sensor—like Aizawa's sensor—has ***peripheral*** detectors positioned around a central light source. Appx02514-02515. No evidence suggests a POSITA would have been motivated to place Inokawa's lens over the multiple peripherally located detectors in Mendelson-1988's forehead sensor. Indeed, Mendelson's later work demonstrates why placing a protrusion on Mendelson-1988's sensor would have contradicted decades of the thinking in the field. *See*

Appx02618-02619 2:47-53, 3:27-67. Mendelson explained that placing pressure on tissue would result in "large errors" because blood near superficial layers of the skin may be displaced from the sensor housing. *Id*. A protrusion would also cause discomfort when used in a "headband or helmet"—Mendelson's preferred measurement location. Appx02513; Appx2520-2521; Appx01717 14:16-21; Appx01731-01732 28:17-29:2; Appx01732-01733 29:22-30:1. Accordingly, this Court should reverse the Board's combination of Mendelson-1988 and Inokawa, which would render patentable '708 patent claims 12 and 23 in IPR193 and '190 patent claims 18 and 30 in IPR195.

D. The Board Erred In Finding That A POSITA Would Have Had A Reasonable Expectation Of Success

The Board also erred in finding that a POSITA would have had a reasonable expectation of success. Appx00040; Appx0074; Appx00128-00129; Appx00149-00150; Appx00221-00222; Appx00231-00232; Appx00298; Appx00311. Apple's expert declarations focused on whether the proposed combinations' protrusion could be manufactured. Appx02209-02210 ¶89; Appx02263-02264 ¶¶177-178; Appx07519-7520 ¶87; Appx07574-07140-141575 ¶¶169-170; Appx12745-12746 ¶91; Appx12773-12774 ¶¶140-141; Appx17814-17815 ¶91; Appx17844 ¶¶142-143. Apple's expert never explained why a POSITA would have reasonably expected the combination to result in an effective physiological optical sensor, as claimed.

Appx04829-04830 ¶75; Appx10147-10148 ¶75; Appx15032-15033 ¶75; Appx20101-20102 ¶75.

Indeed, the Board did not rely on those expert declarations regarding a "reasonable expectation of success." Instead, the Board cited Apple's new "most pronounced curvature" theory and, in some decisions, also cited Apple's new "additional light-capture" theory. *See* Appx00044; Appx00128-00129; Appx00221-00222; Appx00298. As discussed, those theories are unsupported and contrary to Apple's and its expert's admissions. *See supra* Section VII.A. Those admissions undermine any finding of a reasonable expectation of success.

As discussed, Apple's expert argued that a convex lens would direct light centrally, while the combinations place the detectors on the periphery. Appx05086-05087 203:3-204:20. Apple's expert also eventually asserted many other theories not found in Apple's petitions, including that a convex lens would capture some light otherwise not captured. Appx05087-05088 204:21-205:12. But Apple's expert could not say how a POSITA would have balanced the effects of the "additional light-capture" theory with the convex surface's ordinary light ***condensing*** function that directs light away from the peripheral detectors. Apple's expert testified that "[t]here isn't a simple answer to that," Appx05089-05090 206:22-207:10, and the impact "would depend on the ***details*** of the curvature design." Appx05088-05089

205:13-206:5. Apple's expert admitted he presented no such details or reasoning in his declarations. Appx05090-05091 207:11-208:1.

Apple's expert testified at length that whether a convex shape would provide a benefit depends on numerous complex factors, including (1) lens shape, (2) lens thickness, refractive index, and curvature, (3) lens length, (4) location of the sensor elements (including the LEDs and the detector), (5) corpuscles location and depth, and (6) depth of light in the tissue. Appx05193-05194 310:18-311:9; *see also* Appx04983-04984 100:17-101:18; Appx04980 97:11-21 (a "convex lens may concentrate light in ***many different locations***"); Appx05037 154:4-7 (one must know "the ***exact location*** of the reflecting corpuscles"). But Apple's expert performed no analysis balancing the many above factors. Appx04934-04935 51:21-52:16; Appx04976-04977 93:16-94:15; Appx04983-04984 100:17-101:18. Apple's expert also admitted he has never designed an optical physiological sensor and could not recall ever analyzing the impact a particular modification would have on optics. Appx05682-05687 347:14-352:18.

Apple's expert further admitted the purported benefit of Inokawa's lens would ***not*** be "obvious" when applied to a different sensor with, *e.g.*, peripheral detectors and a central emitter. Appx04969-04970 86:19-87:6. Apple's expert could not even explain the impact of a slight change in detector positioning on signal strength in the combination: "So it's ***not obvious*** because part of the answer depends on the depth

of the likely location of the corpuscles that are going to provide the diffuse reflection … [***C***]***ould*** be true, it ***might[] not be***. It would depend on the other dimensions." Appx05214-05215 331:19-332:11.

When asked to explain why the curvature in Apple's combination extends far beyond the detectors, Apple's expert denied his figure showed any precision and agreed a POSITA "looking at Nishikawa and Inokawa and Aizawa might end up with a ***number of different lens shapes***." Appx05071-05072 188:13-189:10. Apple's expert testified a POSITA would engage in "***trial and error*** trying out different shapes, different detector positions, different spacings and so on." Appx05072-05073 189:20-190:13. Apple's expert explained that a POSITA would engage in a complicated light path analysis (called a "ray trace analysis") to arrive at a lens shape, but provided no such analysis. *Id*.

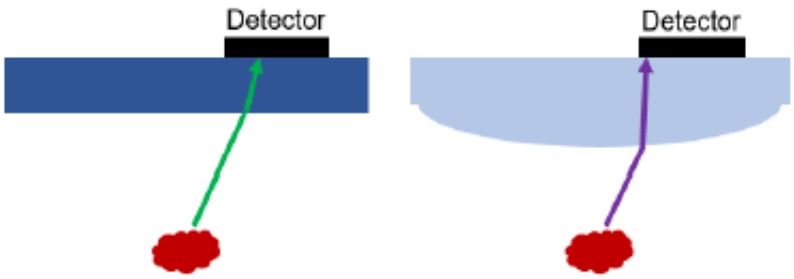
Moreover, "a ***clear***, evidence-supported account of the contemplated workings of the combination is a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have ... reasonably expect[ed] success." *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). No such "clear evidence-supported account" exists here.

Apple's expert repeatedly refused to clearly describe the combinations. Appx04934-04935 51:14-52:16; Appx04958-04960 75:20-77:2; *see also* Appx05216-05218 333:20-335:4. Rather, Apple's expert testified that "[i]f I was

asked to analyze the optical performance of a system like this, I would need to know precisely the shapes and the tolerances around those shapes, the position of the elements, the detectors, the emitters and so on," and "there's tolerances around all of that," "[a]nd ***then*** an analysis can be done." Appx04934-04935 51:21-52:16. The Board erred in finding a reasonable expectation of success, and the Board's finding is unsupported by substantial evidence.

E. Under The "Most Pronounced Curvature" Theory, No Evidence Establishes Invalidity Of Certain Dependent Claims (IPR195/208/209)

Claims 12 and 14 of the '190 patent require that "the light permeable cover is configured to reduce a ***mean path length*** of light traveling to the at least four detectors." Appx00510. Claims 6 and 16 of the '266 and '191 patents require that "the lens is configured to reduce a mean path length of light traveling to the plurality of detectors." Appx00607; Appx00704. As evidence of reduced mean path length, the petitions and original expert declarations in IPR195/208/209 correctly explained that a convex surface condenses light toward the center. *See supra* Section VII.A.1.



Apple's Illustrations of Light-Redirection
(Appx06495; Appx11815; Appx16960)

As discussed, however, the Board did ***not*** accept these admissions and instead embraced Apple's new "most pronounced curvature" theory. *See supra* Section VII.A.2. Under the "most pronounced curvature" theory, Apple's expert never explained how the combination's cover would reduce the mean path length of light. Instead, Apple's expert analyzed these dependent claims by opining that "refraction of the incoming reflected light can shorten the path of the light before it reaches the detector. This is because the incoming light ***is 'condensed' toward the center***…." Appx07532-07534 ¶¶106-107; Appx12753-12754 ¶¶102-103; Appx17822-17823 ¶¶102-103. Absent that condensing analysis, nothing explains how the protrusion in the combinations would reduce the mean path length.

In IPR195/208/209, the Board never squared its "most pronounced curvature" theory with the requirements that "the (light permeable cover / lens) is configured to reduce a mean path length of light traveling to the at least four detectors." In related IPR proceedings, the Board found Apple's expert's analysis of "mean path length" was for "a single ray of light" rather than "the aggregate effect on *all* light that travels through the convex surface." *See*, *e.g.*, *Apple Inc. v. Masimo Corp.*, No. IPR2020-01536, 2022 WL 562452, at *18 (P.T.A.B. Feb. 23, 2022) (emphasis original). But that merely confirms that no evidence supports invalidity. Under the Board's interpretation, Apple's expert presented ***no*** analysis of how the combination satisfies the claim language, which requires a reduced path length of light on ***average***.

Indeed, Apple's expert agreed that "a mean path length mean[s] the same as an average patent [*sic* path] length." Appx05081 198:6-11. Accordingly, under the Board's "most pronounced curvature" theory, this Court should reverse the Board's holdings as to claims 12 and 14 in IPR195 and claims 6 and 16 in IPR208/209 as unsupported.

F. This Court Should Also Reverse The Board's Obviousness Findings Based On Aizawa And Inokawa Because Neither Reference Discloses Every Claim Limitation (IPR208/209)

Every claim in IPR208/209 requires (1) a plurality of emitters and (2) a plurality of detectors or at least four detectors. Appx00606-00607; Appx00703-00704. To attempt to satisfy these claim limitations in some grounds, the Board combined Aizawa and Inokawa, which do not disclose both multiple emitters ***and*** multiple detectors in the same sensor. Appx00239; Appx00315; Appx15036-15037 ¶79; Appx20105-20106 ¶79. Inokawa discloses a sensor with two emitters and one detector. Appx02437 ¶[0058]. Aizawa ***alternatively*** discloses a sensor with ***either*** (1) multiple emitters and one detector, ***or*** (2) one emitter and multiple detectors. Appx02402-2403 ¶¶[0032]-[0033]; Appx02398-02400; Appx015037 ¶80; Appx20106 ¶80.

The Board thus erred in finding obviousness based on Aizawa and Inokawa for this independent reason. The Board should "consider motivation to combine and reasonable expectation of success ***only*** 'if all the elements of an invention are found

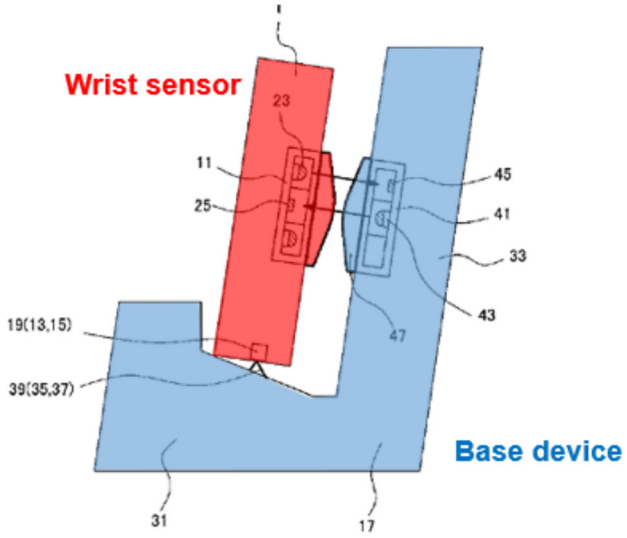
in a combination of prior art references.'" *PAR Pharms., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1194 (Fed. Cir. 2014).

The Board found a POSITA's "ordinary creativity" supplied the missing limitation. Appx00198-00199; Appx00275. But "[o]rdinary creativity" cannot satisfy "a limitation missing from the prior art references specified." *DSS Tech. Mgmt., Inc. v. Apple Inc*., 885 F.3d 1367, 1377 (Fed. Cir. 2018). The Board also pointed to Inokawa, reasoning that Inokawa would have motivated a POSITA to add an LED to Aizawa's multi-detector/single-emitter embodiment to measure "body ***motion***." Appx00193; Appx00269. But Aizawa already provides a "device for computing the amount of ***motion*** load from the pulse rate." Appx02401 ¶[0015]; Appx15039 ¶84; Appx20108 ¶84. Thus, Inokawa does not add functionality to Aizawa's sensor that addresses body motion.

The Board cited paragraphs 71-73 of Apple's expert's original declarations to find that a second LED would "help ***better*** isolate the desired pulse data." Appx00191; Appx00270-00271. But Apple's expert's sole support for that conclusory assertion was non-combination reference Nanba (Appx12968-12988). *Id*. The Board correctly found in a related IPR proceeding that Nanba (like Aizawa) corrects motion with "only a ***single*** light emitting element," and thus "provides ***very little (if any) support*** for [that] testimony." *Apple Inc. v. Masimo Corp.*, No.

IPR2020-01520, 2022 WL 557896, at *12 (P.T.A.B. Feb. 23, 2022). Unsupported and conclusory expert testimony does not establish obviousness.

The Board also found a POSITA would have been motivated to add an LED to Aizawa's sensor to communicate data as disclosed in Inokawa. Appx00195-00196; Appx00272. But Inokawa's sensor transmits information by LED light to a base device:



Inokawa Fig. 3 (color added, Appx02445)

In contrast, Aizawa's sensor uses a ***wireless*** transmitter. Appx02402-02403 ¶¶[0023], [0028], [0035]; Appx15039-15040 ¶¶85-86; Appx20108-20110 ¶¶85-86. Apple's expert admitted that Aizawa's sensor is for ***real-time*** heart rate measurements during exercise. Appx05285 402:6-11; Appx02211-02212 ¶91. Inokawa's sensor cannot transmit data during physiological monitoring because it transmits data only when removed from the wrist and "mounted onto the base device." *See, e.g.*, Appx02427 Abstract; Appx05288 405:2-7; Appx02445-02446

Figs. 3, 8; Appx15040 ¶86; Appx20109-20110 ¶86. A POSITA would not have replaced Aizawa's real-time monitoring and data transmission with Inokawa's cumbersome base-station approach. *See Black & Decker, Inc. v. Positec USA, Inc.,* 646 F. App'x 1019, 1027 (Fed. Cir. 2016) (nonprecedential) (reversing Board's obviousness decision where "proposed modification" to device "seem[ed] to run counter to the intended purpose").

Accordingly, this Court should reverse the Board's combination of Aizawa and Inokawa for this independent reason.

VIII. CONCLUSION

The Board's decisions would have a POSITA ignore (1) the straightforward understanding acknowledged by Apple and its expert that a convex surface condenses light centrally; (2) Ohsaki's teaching that its convex surface is prone to slip off when placed on the palm-side; and (3) Aizawa's teaching that a flat plate provides improved adhesion and detection efficiency at the wrist's palm-side. No prior art discloses or suggests Masimo's innovative approach. The Board's decisions are profoundly flawed and unsupported by substantial evidence. This Court should reverse, or in the alternative, vacate and remand.

Respectfully submitted,

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Dated: December 29, 2022

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CERTIFICATE OF COMPLIANCE

1. This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a). This brief contains 8,896 words, excluding the parts of the brief exempt by Federal Rule of Appellate Procedure 32(f) and Federal Circuit Rule 32(b)(2).

2. This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6). This brief has been prepared in a proportionally spaced typeface using Microsoft Word in 14-point font Times New Roman.

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